

What is claimed is:

1. A geogrid comprising:
 - a plurality of longitudinal fiber-reinforced polymer strips arranged longitudinally in parallel at regular intervals, the longitudinal fiber-reinforced polymer strip being configured so that a strip is reinforced with a fiber in a thermoplastic polymer resin; and
 - a plurality of lateral fiber-reinforced polymer strips arranged laterally in parallel at regular intervals, the lateral fiber-reinforced polymer strip being configured so that a strip is reinforced with a fiber in a thermoplastic polymer resin,
- 10 wherein each of the longitudinal fiber-reinforced polymer strips has at least one first contact point which is crossed with one of the lateral fiber-reinforced polymer strips on an upper surface thereof, and at least one second contact point which is crossed with another one of the lateral fiber-reinforced polymer strips on a lower surface thereof,
 - wherein the thermoplastic polymer resin of the longitudinal fiber-reinforced polymer strip and the thermoplastic polymer resin of the lateral fiber-reinforced polymer strip are welded and fixed at the contact points.
2. A geogrid according to claim 1,
 - wherein each of the longitudinal fiber-reinforced polymer strips is crossed with each of the lateral fiber-reinforced polymer strips so that the first contact point and the second contact point are

positioned in turns.

3. A geogrid according to claim 1,

wherein at least one of the longitudinal fiber-reinforced polymer strips is crossed with the
5 lateral fiber-reinforced polymer strip so that at least two second contact points are positioned
between the first contact points.

4. A geogrid according to claim 1,

wherein the thermoplastic polymer resin of the longitudinal and lateral fiber-reinforced
10 polymer strips is one selected from the group consisting of polyolefin resin having a melt index
(MI) of 1 to 35, polyethylene terephthalate having an intrinsic viscosity (IV) of 0.64 to 1.0,
polyamides, polyacrylates, polyacrylonitrile, polycarbonates, polyvinylchloride, polystyrene,
polybutadiene, and their mixtures.

15 5. A geogrid according to claim 1,

wherein the fiber of the longitudinal and lateral fiber-reinforced polymer strips is an
independent one selected from the group consisting of polyester fiber, glass fiber, aramid fiber,
carbon fiber, basalt fiber, stainless steel fiber, copper fiber and amorphous metal fiber, or their
doubled and/or twisted fiber.

6. A geogrid according to claim 1,

wherein an entire cross section of the fiber of the longitudinal and lateral fiber-reinforced polymer strips is 20 to 80% of an entire cross section of the fiber-reinforced polymer strip.

5 7. A geogrid according to claim 1,

wherein the longitudinal and lateral fiber-reinforced polymer strips respectively have a rectangular cross section having a width of 2 to 30 mm and a thickness of 1 to 10 mm.

8. A geogrid according to claim 1,

10 wherein the longitudinal and lateral fiber-reinforced polymer strips respectively have a circular cross section having a diameter of 2 to 20 mm.

9. A geogrid according to claim 1,

15 wherein the plurality of longitudinal fiber-reinforced polymer strips are arranged in parallel at regular intervals of 10 to 100 mm on the basis of a center line of each longitudinal fiber-reinforced polymer strip, and

wherein the lateral fiber-reinforced polymer strips are arranged in parallel at regular intervals of 10 to 100 mm on the basis of a center line of each lateral fiber-reinforced polymer strip.

20 10. A geogrid according to claim 1,

wherein the plurality of longitudinal fiber-reinforced polymer strips are crossed with the lateral fiber-reinforced polymer strips at an angle of 80 to 100°.

11. A method for producing a geogrid comprising:

- 5 (a) arranging a plurality of longitudinal fiber-reinforced polymer strips, each of which is configured so that a strip is reinforced with a fiber a thermoplastic polymer resin, in parallel;
- (b) bending the plurality of longitudinal fiber-reinforced polymer strips to form ridges and valleys in turns so that the ridge and the valley formed in at least one of the longitudinal fiber-reinforced polymer strips are corresponding to the valley and the ridge formed in at least 10 another one of the longitudinal fiber-reinforced polymer strips;
- (c) inserting at least one lateral fiber-reinforced polymer strip, which is configured so that a strip is reinforced with a fiber in a thermoplastic polymer resin, through a space between the corresponding ridge (or, valley) and valley (or, ridge) of the longitudinal fiber-reinforced polymer strips in order to make the lateral fiber-reinforced polymer strip be crossed with the longitudinal 15 fiber-reinforced polymer strips; and
- (d) adhering the longitudinal and lateral fiber-reinforced polymer strips at contact points at which the longitudinal and lateral fiber-reinforced polymer strips are crossed.

12. A method for producing a geogrid comprising:

- 20 (a) bending a plurality of longitudinal fiber-reinforced polymer strips to form ridges and

valleys in turns so that the ridge and the valley formed in at least one of the longitudinal fiber-reinforced polymer strips are corresponding to the valley and the ridge formed in at least another one of the longitudinal fiber-reinforced polymer strips;

(b) inserting at least one lateral fiber-reinforced polymer strip through a space between the 5 corresponding ridge (or, valley) and valley (or, ridge) of the longitudinal fiber-reinforced polymer strips so as to form a first contact point at which a lower surface of the longitudinal fiber-reinforced polymer strip is crossed with an upper surface of the lateral fiber-reinforced polymer surface and a second contact point at which an upper surface of the longitudinal fiber-reinforced polymer strip is crossed with a lower surface of the lateral fiber-reinforced polymer strip; and

10 (c) adhering the longitudinal and lateral fiber-reinforced polymer strips to each other at the first and second contact points.

13. A method for producing a geogrid according to claim 12,

wherein the first and second contact points are formed in turns in at least one of the 15 longitudinal fiber-reinforced polymer strips.

14. A method for producing a geogrid according to claim 12 or 13,

wherein the at least one of the longitudinal fiber-reinforced polymer strips is a n^{th} strip, and the at least another one of the longitudinal fiber-reinforced polymer strips is a $n+1^{\text{th}}$ strip.

15. A method for producing a geogrid according to claim 12,

wherein at least two second contact points are formed between the first contact points in at least one of the longitudinal fiber-reinforced polymer strips.

5 16. A method for producing a geogrid according to claim 12,

wherein, in the step (c), the thermoplastic polymer resins of the longitudinal and lateral fiber-reinforced polymer strips are welded and fixed to each other at the first and second contact points.

10 17. A method for producing a geogrid according to claim 16,

wherein the first and second contact points are formed by vibration welding, ultrasonic friction welding, or heating adhesion.

18. A method for producing a geogrid according to claim 17,

15 wherein one of the longitudinal and lateral fiber-reinforced polymer strips positioned at the first or second contact points is fixed, while the other is vibrated so as to melt and adhere the thermoplastic polymer resins on opposite surfaces thereof.

19. A method for producing a geogrid according to claim 12,

20 wherein the first and second contact points are adhered step by step.

20. A method for producing a geogrid with fiber-reinforced polymer strips, each of which is configured so that a strip is reinforced with a fiber in a thermoplastic polymer resin, by using a device including a strip arranging means, which has upper and lower plates for oppositely moving at an interval and first and second bending members alternatively protruded on opposed surfaces of the upper and lower plates, the method comprising:

(a) supplying a plurality of longitudinal fiber-reinforced polymer strips in a row between the upper and lower plates along the first and second bending members;

(b) bending the longitudinal fiber-reinforced polymer strip by moving the upper and lower plates to approach to each other so that a portion of the longitudinal fiber-reinforced polymer strip pressed by the first bending member becomes a valley, while a portion of the longitudinal fiber-reinforced polymer strip pressed by the second bending member becomes a ridge;

(c) inserting a lateral fiber-reinforced polymer strip through the corresponding ridge (or, valley) and valley (or, ridge) of the plurality of longitudinal fiber-reinforced polymer strips so that the lateral fiber-reinforced polymer strip is crossed with the longitudinal fiber-reinforced polymer strips; and

(d) adhering contact points at which the longitudinal and lateral fiber-reinforced polymer strips are crossed to each other.

20 21. A method for producing a geogrid according to claim 20,

wherein support grooves are formed on the first and second bending members along the longitudinal fiber-reinforced polymer strips so that the longitudinal fiber-reinforced polymer strips are not deviated when being pressed.

5 22. A method for producing a geogrid according to claim 20,

wherein through holes are formed in the first and second bending members respectively so that the lateral fiber-reinforced polymer strip is inserted to pass through.

23. A method for producing a geogrid according to claim 20,

10 wherein, in the step (d), the contact points are adhered by means of a welding unit which includes:

upper and lower jigs which oppositely moves at an interval; and
a plurality of support holders protruded on opposite surfaces of the upper and lower jigs so as to be opposed with each other.

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24. A method for producing a geogrid according to claim 23,

wherein one of the longitudinal and lateral polymer strips crossed at the contact point is pressed and supported by one of the opposite support holders, and
wherein the other of the longitudinal and lateral polymer strips crossed at the contact point 20 is pressed and vibrated by the other of the opposite support holders so that the contact point is

adhered.

25. A method for producing a geogrid according to claim 24,

wherein, in the step (c), a first contact point at which a lower surface of the longitudinal

5 fiber-reinforced polymer strip is crossed with an upper surface of the lateral fiber-reinforced polymer strip and a second contact point at which an upper surface of the longitudinal fiber-reinforced polymer strip is crossed with a lower surface of the lateral fiber-reinforced polymer strip are formed, and

wherein the first and second contact points are adhered step by step with the use of the

10 welding unit.